

CLAIMS

1. A method for manufacturing an hydraulic binder or thermoplastic containing product including the steps of:
 - a) Providing a flexible open cell polymeric foam element; and
 - b) Providing a binder selected from:
 - i) An hydraulic binder slurry; or
 - ii) A mixture of a pozzolan and either lime or Portland cement in the form of a slurry;
 - iii) A synthetic geopolymers precursor slurry; or
 - iv) A thermoplastic material in liquid form;
 - c) Introducing the binder into the open cells of the foam element by either:
 - i) Compressing the foam element to exclude air from the open cells and then releasing the compression with the foam element in contact with the binder so that the binder penetrates and becomes contained in the open cells of the foam element as it regains its shape; or
 - ii) Impregnating the binder into the foam element under pressure so that the binder penetrates and becomes contained in the open cells of the foam element; and
 - d) Allowing the binder to set or harden and dry to form the product.
2. A method according to claim 1 wherein the foam element is submerged in the binder, and whilst submerged, the foam element is compressed to exclude air from the open cells and the compression is then released so that the slurry penetrates and becomes contained in the open cells.

3. A method according to claim 1 wherein the binder is applied to a surface of the foam element, the foam element with the binder thereon is compressed to exclude air from the open cells by a roller or perforated plate, and then the compression is released so that the binder penetrates and becomes contained in the open cells.
4. A method according to claim 1 wherein the compression of the foam element is carried out by passing the foam element between a first roller and a surface and applying the binder to the surface of the foam element directly by at least the first roller and the surface.
5. A method according to claims 1 and 4 wherein the binder feed arrangement used in conjunction with the perforated rollers comprises of an inner solid stationery core, the outer surface of which is in sliding contact with the inner surface of the perforated roller, and into which is cut a feed channel the position of which in relation to the perforated feed roller and its contact with the foam element is adjustable.
6. A method according to claim 1 wherein the binder is impregnated into the flexible open cell polymeric foam element by injection from one side and then from the opposite side of the open cell polymeric foam element.
7. A method according to claims 1 to 8 wherein before the binder sets or hardens the foam element containing the binder is formed into a desired shape.
8. A product containing an hydraulic binder or a thermoplastic material in liquid form which is made by a method including the steps of:
 - a) Providing a flexible open cell polymeric foam element; and
 - b) Providing a binder selected from:
 - i) An hydraulic binder slurry; or
 - ii) A mixture of a pozzolan and either lime or Portland cement in the form of a slurry;

- iii) A synthetic geopolymers precursor slurry; or
- iv) A thermoplastic material in liquid form;

c) Introducing the binder into the open cells of the foam element by either:

- i) Compressing the foam element to exclude air from the open cells and then releasing the compression with the foam element in contact with the binder so that the binder penetrates and becomes contained in the open cells of the foam element as it regains its shape; or
- ii) Impregnating the binder into the foam element under pressure so that the binder penetrates and becomes contained in the open cells of the foam element; and

d) Allowing the binder to set or harden and dry to form the product.

9. A product according to claim 8 in which the flexible open cell polymeric foam element is a flexible open cell polyurethane foam in the density range 7 to 20kg/m³ either flat or profiled on one or both surfaces.

10. A product according to claim 8 in which the flexible open cell polymeric foam element is a flexible open cell polyurethane foam which has 80% of the cells sizes in the range 1 to 5mm diameter.

11. A product according to claim 8 in which the hydraulic binder slurry is chosen from the group comprising of the alpha or beta hemihydrates of calcium sulphates, Portland cement, calcium aluminate, a pozzolan with lime or with Portland cement, and magnesium oxichloride or a magnesium oxisulphate.

12. A product according to claim 8 in which the thermoplastic material in liquid form is chosen from a dispersion or emulsion of vinyl polymers, polymers of acrylates or methacrylates or a solution of a polyvinyl alcohol in water or combinations between them.
13. A product according to claim 8 in which the thermoplastic material is a molten thermoplastic chosen from polyethylene, polystyrene, polypropylene, polyvinyl chloride, polyvinyl acetal, ABS, bitumen, or waste refinery product.
14. A product according to claim 8 which is laminated on both sides with paper bound to the board with a choice of gypsum or alkali silicate in water slurry reinforced with a thermoplastic polymer in water chosen from acrylates, methacrylates, vinyls and polyvinyl alcohols.
15. A product according to claim 8 which is lined on both sides by a gypsum in water slurry reinforced with a thermoplastic polymer in water chosen from acrylates, methacrylates, vinyls and polyvinyl alcohols.
16. A product according to claim 8 which is post impregnated with hydrate pre-cursors or hydrogels chosen from compounds that form hydrates that release water at temperatures below 300°C or alkali silicates respectively or intumescent compounds.
17. A product according to claim 8 in which the hydraulic binder slurry is caused to foam before or after its induction into the flexible open cell polymeric foam element.